Services

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What is a service?

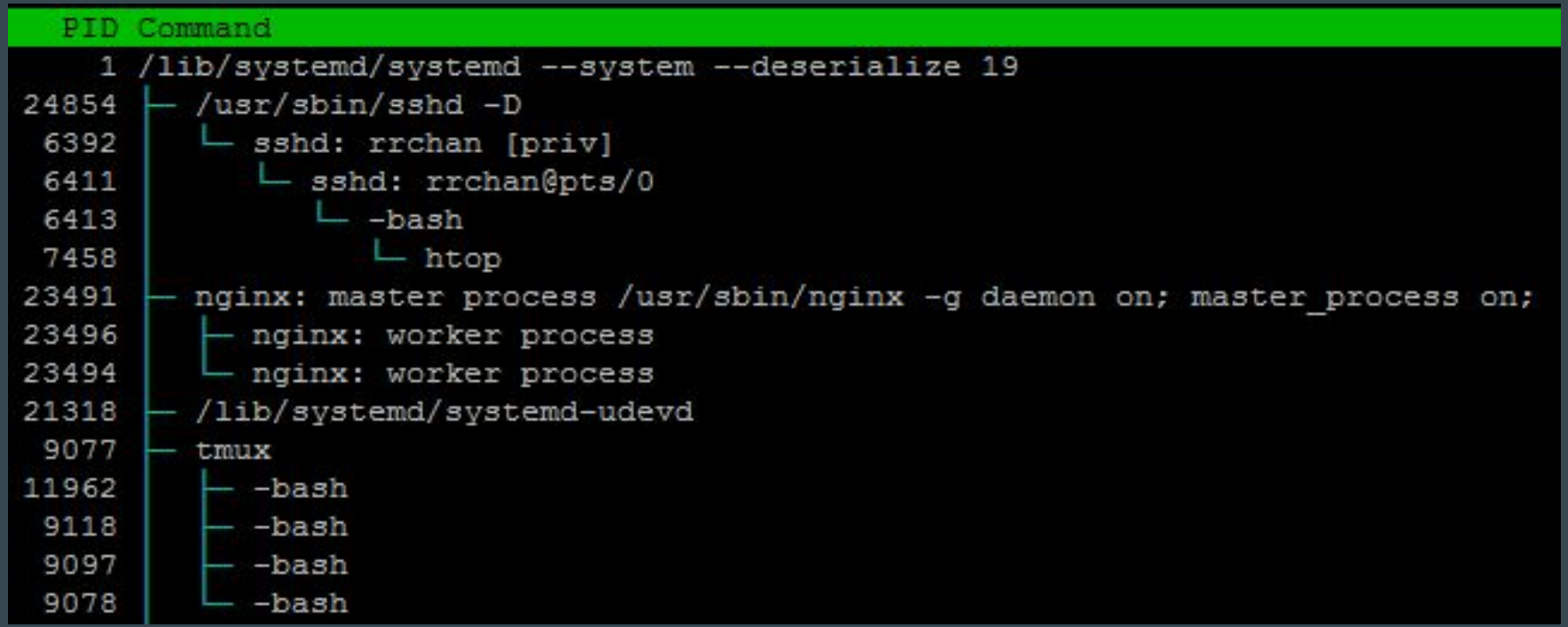
- A service is a type of process known as a **Daemon**
  - A daemon is a noninteractive background process
  - Typically names end with a ‘d’, but not always the case
- Services are controlled by an **init** system
- Examples: sshd, httpd, rsyslogd, nginx, postfix, ...
- Not a strict definition

Services - What's the point?

- Can run for long periods of time
  - Useful in many cases, such as web servers
- Can be publicly accessible or shared between multiple users
  - Can be networked.
- Ex. sshd allows for incoming ssh connections - very important
- Can write your own services!

Init

- First process started at boot, given PID 1
  - Manages all other services and processes
- Run `htop`, open tree view (f5). What is the root of the tree?


PID Command
1 /lib/systemd/systemd --system --deserialize 19
24854 ├─ /usr/sbin/sshd -D
6392 │ └─ sshd: rrchan [priv]
6411 │ └─ sshd: rrchan@pts/0
6413 │ └─ -bash
7458 │ └─ htop
23491 ├─ nginx: master process /usr/sbin/nginx -g daemon on; master_process on;
23496 │ ├─ nginx: worker process
23494 │ └─ nginx: worker process
21318 ├─ /lib/systemd/systemd-udevd
9077 ├─ tmux
11962 │ ├─ -bash
9118 │ ├─ -bash
9097 │ ├─ -bash
9078 │ └─ -bash

Systemd

- **Systemd** is an init system that manages processes and services
  - Most commonly used init system on modern Linux systems
- Provides tools for users to manage services
  - `systemctl` - start, stop, check status, and more
  - `journalctl` - check systemd journal
- Some debate in the free software community about systemd

Systemd Unit Files

- Service behavior defined by systemd **unit files**
  - How should this service start up? How should it respond to various `systemctl` management commands?

A (simplified) Unit File: helloworld.service

```
[Unit]
Description=A simple unit file

[Service]
ExecStart=/usr/bin/helloworld
User=ocfstaff
Restart=always

[Install]
WantedBy=multi-user.target
```

Description - what the service does

Commands

When this unit should get started

Example Unit file - Nginx

```
[Unit]
Description=A high performance web server and a reverse proxy server
Documentation=man:nginx(8)
After=network.target

[Service]
Type=forking
PIDFile=/run/nginx.pid
ExecStartPre=/usr/sbin/nginx -t -q -g 'daemon on; master_process on;'
ExecStart=/usr/sbin/nginx -g 'daemon on; master_process on;'
ExecReload=/usr/sbin/nginx -g 'daemon on; master_process on;' -s reload
ExecStop=-/sbin/start-stop-daemon --quiet --stop --retry QUIT/5 --pidfile /run/nginx.pid
TimeoutStopSec=5
KillMode=mixed

[Install]
WantedBy=multi-user.target
```

`systemctl` (no args) - Info about systemd units

```
UNIT                                                LOAD   ACTIVE SUB       DESCRIPTION
proc-sys-fs-binfmt_misc.automount                   loaded active running   Arbitrary Executable File Formats File System Automount Point
sys-devices-pci0000:00-0000:00:03.0-virtio0-net-ens3.device loaded active plugged Virtio network device
sys-devices-pci0000:00-0000:00:05.0-virtio1-block-vda-vda1.device loaded active plugged /sys/devices/pci0000:00/0000:00:05.0/virtio1/block/vda/vda1
sys-devices-pci0000:00-0000:00:05.0-virtio1-block-vda-vda2.device loaded active plugged /sys/devices/pci0000:00/0000:00:05.0/virtio1/block/vda/vda2
sys-devices-pci0000:00-0000:00:05.0-virtio1-block-vda.device loaded active plugged /sys/devices/pci0000:00/0000:00:05.0/virtio1/block/vda
sys-devices-platform-serial8250-tty-ttyS1.device    loaded active plugged   /sys/devices/platform/serial8250/tty/ttyS1
sys-devices-platform-serial8250-tty-ttyS2.device    loaded active plugged   /sys/devices/platform/serial8250/tty/ttyS2
sys-devices-platform-serial8250-tty-ttyS3.device    loaded active plugged   /sys/devices/platform/serial8250/tty/ttyS3
sys-devices-pnp0-00:04-tty-ttyS0.device             loaded active plugged   /sys/devices/pnp0/00:04/tty/ttyS0
sys-subsystem-net-devices-ens3.device               loaded active plugged   Virtio network device
-.mount                                             loaded active mounted   Root Mount
dev-hugepages.mount                                 loaded active mounted   Huge Pages File System
dev-mqueue.mount                                    loaded active mounted   POSIX Message Queue File System
proc-sys-fs-binfmt_misc.mount                       loaded active mounted   Arbitrary Executable File Formats File System
run-user-49390.mount                                loaded active mounted   /run/user/49390
sys-kernel-debug.mount                              loaded active mounted   Debug File System
systemd-ask-password-console.path                   loaded active waiting   Dispatch Password Requests to Console Directory Watch
systemd-ask-password-wall.path                      loaded active waiting   Forward Password Requests to Wall Directory Watch
init.scope                                          loaded active running   System and Service Manager
session-c15.scope                                   loaded active abandoned Session c15 of user rrchan
session-c85.scope                                   loaded active running   Session c85 of user rrchan
● apache2.service                                   loaded failed failed    The Apache HTTP Server
console-setup.service                               loaded active exited    Set console font and keymap
cpufrequtils.service                                loaded active exited    LSB: set CPUFreq kernel parameters
cron.service                                        loaded active running   Regular background program processing daemon
dbus.service                                        loaded active running   D-Bus System Message Bus
getty@tty1.service                                  loaded active running   Getty on tty1
irqbalance.service                                  loaded active running   irqbalance daemon
keyboard-setup.service                              loaded active exited    Set the console keyboard layout
kmod-static-nodes.service                           loaded active exited    Create list of required static device nodes for the current kernel
loadcpufreq.service                                 loaded active exited    LSB: Load kernel modules needed to enable cpufreq scaling
lvm2-lvmetad.service                                loaded active running   LVM2 metadata daemon
lvm2-monitor.service                                loaded active exited    Monitoring of LVM2 mirrors, snapshots etc. using dmeventd or progres
munin-node.service                                  loaded active running   Munin Node
netfilter-persistent.service                        loaded active exited    netfilter persistent configuration
networking.service                                  loaded active exited    Raise network interfaces
nginx.service                                       loaded active running   A high performance web server and a reverse proxy server
node_exporter.service                               loaded active running   Prometheus node_exporter
ntp.service                                         loaded active running   LSB: Start NTP daemon
php7.3-fpm.service                                  loaded active running   The PHP 7.3 FastCGI Process Manager
postfix.service                                     loaded active exited    Postfix Mail Transport Agent
postfix@-.service                                   loaded active running   Postfix Mail Transport Agent (instance -)
```

`systemctl status [name]` - Gets info about a service's status

```
rrchan@solarflare:~$ systemctl status nginx
● nginx.service - A high performance web server and a reverse proxy server
   Loaded: loaded (/lib/systemd/system/nginx.service; enabled; vendor preset: enabled)
   Active: active (running) since Sat 2019-10-19 09:35:48 PDT; 2 days ago
     Docs: man:nginx(8)
 Main PID: 23491 (nginx)
    Tasks: 3 (limit: 4915)
   CGroup: /system.slice/nginx.service
           ├─23491 nginx: master process /usr/sbin/nginx -g daemon on; master_process on;
           ├─23494 nginx: worker process
           └─23496 nginx: worker process
```

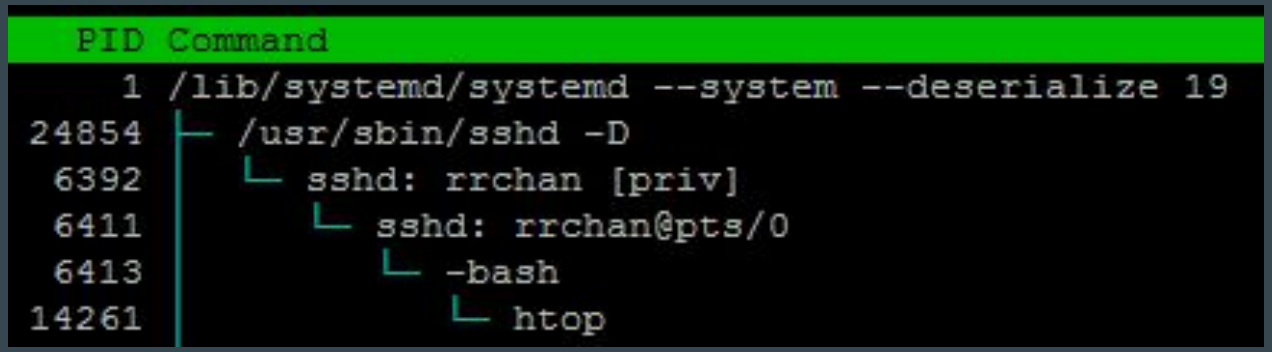
More systemctl!

- `systemctl start [name]` - starts a service
- `systemctl stop [name]` - stops a service
- `systemctl restart [name]` - restarts a service
- `systemctl reload [name]` - reload a service's configuration
- `systemctl enable [name]` - sets a service to start on boot
- `systemctl disable [name]` - opposite of *enable*

Behavior for these commands depends on the service, as defined in the unit file, but typically will do the things listed above.

Example - sshd

- Handles ssh connections



- Notice that *bash* and *htop* are children of sshd, since I am ssh'd into this machine.

Example - nginx and httpd

- nginx - http webserver daemon named ‘Nginx’
- httpd - http webserver daemon named ‘Apache’

Both examples of services which listen on port 80 and serve content.

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